TCA & carbohydrates

1-The steps of glycolysis between glyceraldehyde 3-phosphate and 3-phosphoglycerate involve all of the following EXCEPT

a. ATP synthesis

.b. utilization of Pi

.+c. oxidation of NADH to NAD

.d. reduction of NAD+ to NADH

.e. formation of 1,3 bisphosphoglycerate

2-When a muscle contracts aerobically, less lactic acid is formed than when it contracts anaerobically because under aerobic conditions .

.a. muscles cannot convert glucose 6-phosphate to pyruvate

.b. most of the pyruvate generated is oxidized

.c. the lactic acid generated is rapidly converted back to glucose

.d. the major source of energy is the pentose pathway

.e. the major source of energy is creatine phosphate

3-The conversion of 1 mol of glucose 1-phosphate to 2 mol of pyruvate by the glycolytic pathway results in a net formation of .

.a. 1 mol of NAD+ and 2 mol of ATP

.b. 1 mol of NADH and 2 mol of ATP

.c. 2 mol of NADH and 2 mol of ATP

.d. 2 mol of NADH and 3 mol of ATP

.e. 2 mol of NAD+ and 3 mol of ATP

4- Which combination of cofactors is involved in the conversion of pyruvate to acetyl-CoA .

a. NAD+, biotin, and TPP

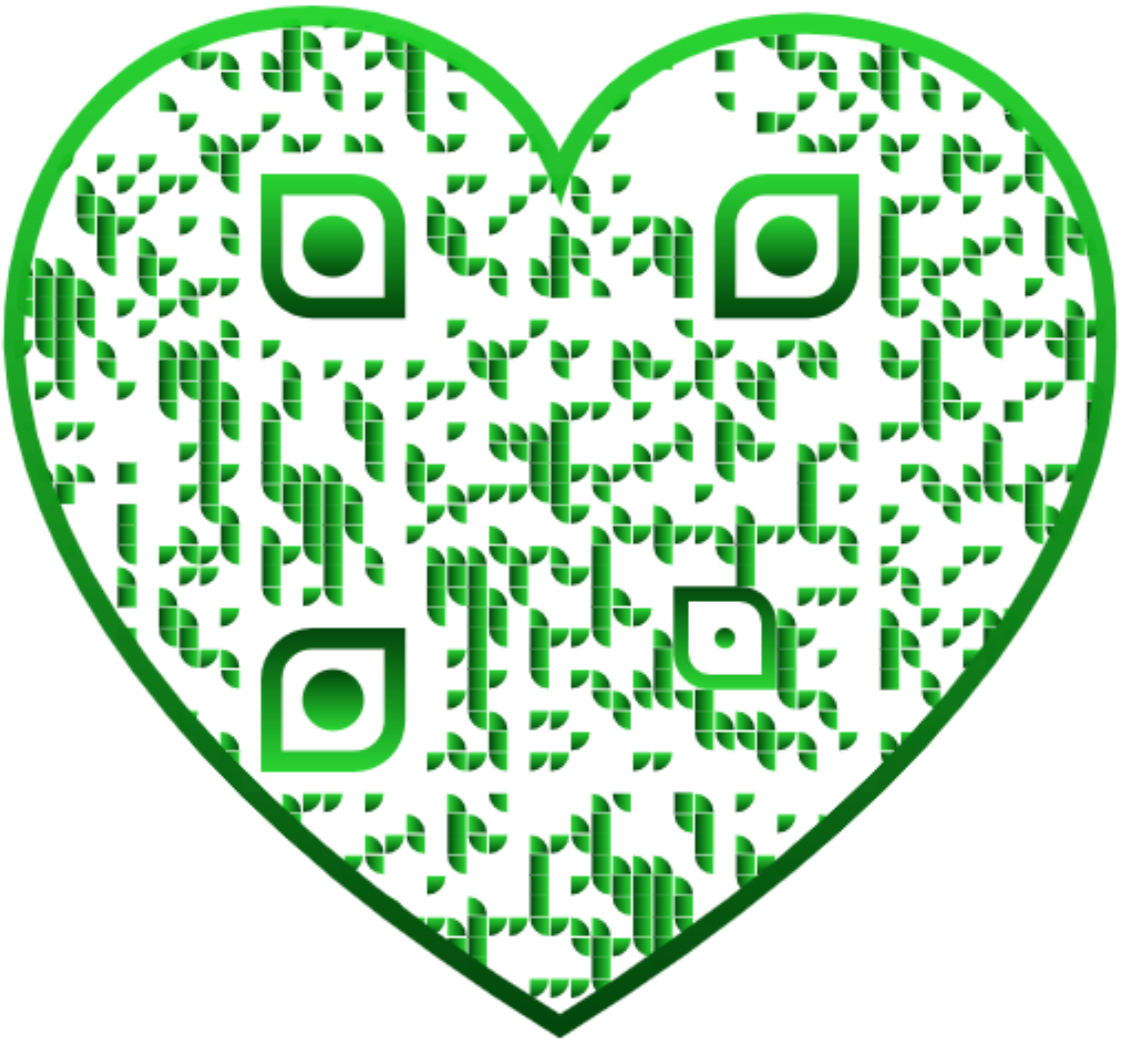
+b. TPP, lipoic acid, and NAD

c. pyridoxal phosphate, FAD, and lipoic acid

d. biotin, FAD, and TPP

e. biotin, NAD+, and FAD

5-The conversion of 1 mol of pyruvate to 3 mol of CO_2 via pyruvate dehydrogenase and the citric acid cycle yields ___mol of NADH, ____mol of $FADH_2$, and ___mol of ATP (or GTP .(



a. 3; 2; 0

b. 4; 2; 1

c. 4; 1; 1

d. 3; 1; 1

e. 2; 2; 2

6-An enzymatic reaction that is most similar to the conversion of pyruvate to acetyl CoA is catalyzed by .

.a. citrate synthase

.b. alpha-ketoglutarate dehydrogenase

.c. succinyl-CoA synthetase

.d. isocitrate dehydrogenase

.e. succinate dehydrogenase

7-Intermediates of the citric acid cycle are replenished by a reaction converting pyruvate to .

.a. oxaloacetate

.b. citrate

.c. alpha-ketoglutarate

.d. succinyl-CoA

.e. acetyl-CoA

8-Which enzyme is used in gluconeogenesis but not glycolysis .

a. Phosphoglucoisomerase

b. Lactate dehydrogenase

c. Glucose 6-phosphatase

d. 3-Phosphoglycerate kinase

e. Aldolase

9-All of the following compounds can serve as the starting material for the synthesis of glucose via gluconeogenesis EXCEPT

.a. alanine

.b. oleic acid

.c. aspartic acid

.d. glycerol

.e. pyruvate

10-Substrates for glycogen synthase are .

.a. glucose 1-phosphate and the C-4 hydroxyl of primer

.b. UDP-glucose and the C-4 hydroxyl of primer

.c. UDP-glucose and the C-6 hydroxyl of primer

.d. UDP-glucose and the C-1 hydroxyl of primer

.e. glucose 1-phosphate and the C-1 hydroxyl of primer

11-The main function of the hexose monophosphate pathway is to .

.a. supply energy in adipose tissue and liver

.b. provide an additional pathway for production of fructose 6-phosphate

.c. increase the cytoplasmic NADH/NAD+ ratio

.d. replenish TCA cycle intermediates

.e. supply pentoses and NADPH

12-In a tissue that metabolizes glucose via the hexose monophosphate pathway, C-1 of glucos . would be expected to end up principally in

.a. glycogen

.b. phosphoglycerate

.c. carbon dioxide

.d. ribulose 5-phosphate

.e. pyruvate

13-Galactosemia is a genetic error of metabolism associated with a/an .

.a. inability to transport galactose into cells

.b. inability to digest lactose

.c. deficiency of galactokinase

.d. deficiency of UDP-glucose: galactose 1-phosphate uridylyltransferase

.e. deficiency of UDP-glucose

14-The rate-limiting step in glycolysis is .

.a. the breakdown of glycogen

.b. the phosphorylation of glucose

.c. isomerization of glucose 6-phosphate to fructose 6-phosphate

.d. the phosphorylation of fructose 6-phosphate

.e. formation of ATP from phosphoenolpyruvate

15-Entry of acetyl-CoA into the citric acid cycle decreases as .

.a. the ratio of [ATP]/[ADP] increases

.b. [AMP] increases

.c. the ratio of [NAD+]/[NADH] increases

.d. the rate of electron transport increases

16-Elevated epinephrine levels stimulate all of the following EXCEPT .

.a. glycogen breakdown in muscle

.b. glycogen synthesis in liver

.c. gluconeogenesis in liver

.d. glycolysis in muscle

.e. fatty acid mobilization in adipose tissue

17-In the signal transduction cascade leading to glycogen breakdown, the most immediate effect . of increasing [cAMP] is

.a. activation of protein kinase A

.b. inactivation of glycogen synthase

.c. activation of phophorylase kinase

.d. activation of glycogen phosphorylase

18-Which fuel can produce the most ATP per second in a working muscle .

a. glycogen

b. glucose

c. glucose 1-phosphate

d. fatty acids

e. creatine phosphate

19-During aerobic glycolysis in muscle, which of the following compounds transfers electrons from . **the cytosol directly to a flavoprotein on the cytoplasmic face of the inner mitochondrial ?membrane**

a. lactate

b. NADH

c. glycerol phosphate

d. malate

e. NADPH

Ans:C

20-During anaerobic glycolysis, there is a net production in the cytosol of lactate and .

.+a. NAD

.b. NADH

c. CO2

.d. ATP

.e. FADH2

21-The committed step of the glycolytic pathway is catalyzed by .

.a. hexokinase/glucokinase

.b. phosphofructokinase-1

.c. aldolase

.d. glycerol 6-phosphate dehydrogenase

.e. pyruvate kinase

23-In the reaction mechanism for the oxidative decarboxylation of pyruvate, which cofactor is . ?required for the decarboxylation step

a. Thiamine pyrophosphate

b. Lipoic acid

c. FAD

+d. NAD

e. Biotin

24-Lactic acid taken from the blood is a significant fuel for the heart. If 30 ATPs are produced (net yield) by the complete oxidation of glucose, approximately how many ATPs can be produced in the ?heart by the complete oxidation of 1 lactate molecule

a. 2

b. 3

c. 6

d. 10

e. 14

25-During aerobic glycolysis in muscle, electrons transferred to dihydoxyacetone phosphate enter . the mitochondrial electron transport chain at

.a. complex I

.b. complex II

.c. complex III

.d. cytochrome c

.e. coenzyme Q

26-The protein that binds to and directly reduces complex IV in mitochondrial electron transport is .

.a. cytochrome aa3

.b. cytochrome bc1

.c. cytochrome c

.d. succinate dehydrogenase

.e. NADH:Q reductase

27-Barbiturates such as amytal disrupt energy metabolism by blocking the exit of electrons from . complex I. This would prevent the oxidation of

.a. CoQH2

.b. NADH

.c. FADH2 in complex II

.d. cytochrome c

28-In the conversion of 1 molecule of acetyl CoA to carbon dioxide, how many O2 molecules are . ?consumed or produced directly by the reactions of the citric acid cycle

a. 1 produced

b. 2 produced

c. 1 consumed

d. 2 consumed

e. 0 consumed or produced

29-Which of the following metabolites can NOT be a substrate for gluconeogenesis .

a. Alanine

b. Acetate

c. Glutamate

d. Lactate

e. Succinate

30-An enzyme that is common in both glycolysis and gluconeogenesis

a. Phosphofructokinase-1

b. Glucokinase

c. Aldolase

d. Fructose bisphosphatase

e. Pyruvate carboxylase

31-In the elongation of glycogen, activated glucosyl units are attached to which hydroxyl of the terminal residue of the growing chain?

a. C-1

b. C-2

c. C-3

d. C-4

e. C-6

32-In the breakdown of muscle glycogen, the predominant product is.

.a. glucose

.b. glucose 1-phosphate

.c. UDP-glucose

.d. maltose

.e. maltotriose

33-Which enzyme is activated by direct binding of cAMP to a regulatory subunit.

a. Adenylate cyclase

b. Protein kinase A

c. Phosphorylase kinase

d. Protein phosphatase

e. Phosphorylase

**34-Several hours after a meal, when blood glucose levels are approximately 6 mM, the .
glucokinase activity of the liver is approximately equal to the activity of**

.a. glucose 6-phosphatase

.b. glucose phosphate isomerase

.c. phoshofructokinase-1

.d. glucose 6-phosphate dehydrogenase

.e. glycogen synthetase

35-The most important allosteric inhibitor of glycolysis in resting muscle is .

.a. AMP

.+b. H

.c. ATP

.d. Fructose 2,6 bisphosphate

.e. cAMP

**36-A pathway/step of carbohydrate metabolism that is stimulated by insulin in muscle, but not in .
:liver**

a. Glycolysis

b. Gluconeogenesis

c. Glycogenolysis

d. Glycogen synthesis

e. Glucose transport

**37-In most tissues, an increase in the following ratio directly causes an increase in TCA cycle .
:activity**

a. ADP/ATP

b. ATP/ADP

c. GTP/GDP

+d. NADH/NAD

e. NAD+/NADH

38-A 23 year old man is unable to exercise vigorously without developing muscle cramps. Studies of his exercising forearm reveal that during maximal work, he does not produce lactate. This individual most likely has a deficiency of

.a. fructose 1,6 bisphosphatase

.b. PEP carboxykinase

.c. pyruvate dehydrogenase

.d. glycogen debranching enzyme

.e. glycogen phosphorylase

39-In the digestive tract, disaccharides such as sucrose are hydrolyzed to monosaccharides mainly . by enzymes located in the

.a. saliva

.b. gastric secretions

.c. lumen of the small intestine

.d. brush border of the small intestine

.e. lumen of the large intestine

40-All of the following are products of the oxidative branch of the hexose monophosphate . pathway EXCEPT

.a. CO_2

.b. ribulose 5-phosphate

.c. NADPH

.d. NADH

41-The protein that binds and directly reduces the terminal electron acceptor in mitochondrial electron transport is

.a. cytochrome oxidase

.b. succinate dehydrogenase

c. coenzyme QH_2

.d. NADH:Q reductase

.e. cytochrome bc1

42-All of the following use coenzyme Q as either substrate or product EXCEPT .

a. Complex I

b. Complex II

c. Complex III

d. Complex IV